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ABSTRACT

Different kinds of pictorial databases are described with respect to aims, user groups, search possibilities, storage, and distribution. Some specific examples are given for databases used for the following purposes: (1) labor markets for artists; (2) document management; (3) telling a story; (4) preservation (archives and museums); (5) research; (6) spreading general information; (7) spreading topical information; (8) spreading specialized information; (9) document handling; (10) providing information on products and services; (11) information on museums and exhibits; (12) remote communication; (13) personnel files; (14) presentations; (15) producing documents; (16) producing educational materials; (17) multimedia production; (18) print media production; (19) television production; (20) creating personalized products; (21) use by students; (22) sales; (23) control of publication rights; and (24) videotext information. One figure provides an example of information stored. (SLD)

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Image Databases

by
Rune Pettersson

This paper is a summary of an overview of different kinds of pictorial databases. In the overview, databases are discussed with respect to aims, user groups, search possibilities, storage, and distribution. Image databases are used for many different purposes. Examples are archives, catalogues, desktop publishing, educational material, general information, production of books and newspapers, research, specific information, and sales. The Swedish Council For Planning and Coordination of Research (FRN) funded the study.

Image database technology is undergoing fast development and is becoming widely used. Today, it's easy to store thousands of still photographs on optical discs. It is however often difficult to find them when they're needed. There are a host of different methods for indexing pictures and chances are that "the desired content" will not match a user's search criteria (Pettersson, 1989).

In 1991 FRN funded a project intended to describe general aspects of a variety of types of image databases. The project has involved reviewing informational material from a variety of sources, studying prototypes and systems shown at conferences and expositions. A summary of the findings discussed in the FRN report follows (Pettersson, 1992).

Labor market for artists

The *Visual Artists Database, AXIS*, will be a source of information on currently active visual artists in Great Britain. It will serve as a line of communication between artists and users/buyers of art—government agencies, organizations, companies, and individuals. This increased exposure will probably create new job opportunities for artists—decorating public buildings, parks, etc. Also, it may help artists sell their finished works, or lead to other opportunities—lecturing in schools and libraries, for example.

Managing documents

Many companies have digital archive and document management systems. These systems can handle scanning, storage, and recovery of documents including text, pictures, diagrams, etc. Some systems, such as the *Grundig-GBA 2000 Electronic Archive System*, are suitable for the management of smaller archives. Others, such as *ImBase* and *Megadoc* are intended for larger archives.

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Telling a story

Most systems present information in a very neutral and objective manner. It can just as well be presented in entertaining, stimulating, interesting, maybe even subjective formats. These formats can tell an intriguing story about the information. A project at Naturens Hus (The House of Nature) in Stockholm, documenting the Stockholm area's natural surroundings, is an example of this type of presentation, involveing not merely an image database but a full-scale multimedia system.

Preservation

The primary task of many archives and museums is the preservation and documentation of various types of objects. Image databases can do this, and will also make it easier to distribute such information outside museum walls. Museum information can thus reach a wider audience and be accessible for general use, study, and research.

Research

Some image databases are sources of specific information used in education and the transmission of knowledge. *TELIV* is a joint project run by UCIV, Universitetets Centrum för Interaktiv Video (The University Centre for Interactive Video), at the Malmö School of Dentistry and Lunds Datacentral för Forskning och Högre Utbildning (the Computer Centre for Research and Higher Education at the University of Lund). The goal of the project is to make pictures stored on electronic media available to researchers and educators in real time. It will be possible to access one or more video disc players from any terminal at the school of dentistry. A more ambitious UCIV project in the same vein is *Lunidia*. It will permit users of any computer connected to the Swedish university computing network, SUNET, to retrieve text and pictures from any database.

Spreading general information

Image databases can be used to spread broad, general information—encyclopedic information aimed at the public, providing introductions to a variety of topics. This use of image database technology could serve to improve the general level of education.

Caxton, a British publisher of reference works, was already experimenting with putting reference volumes and image databases on videotex in the late 1970's. Grolier, an American publisher, was marketing on-line and video disc versions of its reference works by the early 1980's, and CD-ROM versions (without pictures) by 1985. Grolier has for many years been preparing to release its works on CD-I, which handles pictures entirely differently from CD-ROM. An early Swedish publisher of reference volumes on CD-ROM was Esselte, which brought out its first CD-ROM encyclopedia in 1987. The target market includes libraries, the editorial departments of newspapers and magazines. One thousand pictures are stored on this CD-ROM.

Spreading topical information

The *British Film Institute* in London has a total of 6 million still photographs of actors and actresses, directors, etc.; 1 million newspaper clippings; and 400,000 films and television programs. They wish to make this material available to a variety of user groups: researchers, teachers, students, and the public. Information on

films, TV programs, actors and actresses, directors, etc. has already been entered in a bibliographic text database, *SIFT* (Summary of Information on Film and Television). The pictures will be stored on optical discs.

The *BPI image bank*, developed at the Bibliotheque Publique d'information at the Centre Georges Pompidou in Paris, France, will contain 30,000 pictures. The pictures are organized using a standard library cataloguing method. They will be stored on a hard disk and distributed via ISDN, Integrated Services Digital Network, a broadband network for transmission of data, text, sound, and pictures.

Spreading specialized information

This area of use entails the spreading of detailed information to small target groups. *LaserNet* is an information and communication system offering information on art and antiques. The system stores the pictures and can be used to locate particular objects for interested customers, to access lists of auction prices, and to help prevent the purchase and sale of stolen goods. With accompanying text, they service subscribers via satellite. To use the database, a subscriber needs a satellite dish and a computer with a hard disk. Searches are based on text.

Poisonous Plants and Fungi, is a 200 picture database produced by The National Poisons Unit in London, UK. The pictures will be used by poison centers throughout Great Britain to identify plants poisonous to people. The pictures will be stored digitally on CD-ROM-XA. Searches will be made with the aid of an expert system. Pictures highlight characteristics used to distinguish between species, such as the shape and color of leaves and flowers, helping users decide, which pictures most resemble the plant in question. When the characteristics of the plant are defined, the system will display possible identifications and recommend treatment.

Document handling

Among the numerous systems for document handling, the more advanced electronic archive systems do much more than merely store information. One example is the *InfoImage Folder*. It can be adapted to meet a variety of user needs, such as offering the ability to attach electronic memos and reminders to individual documents.

Information on products and services

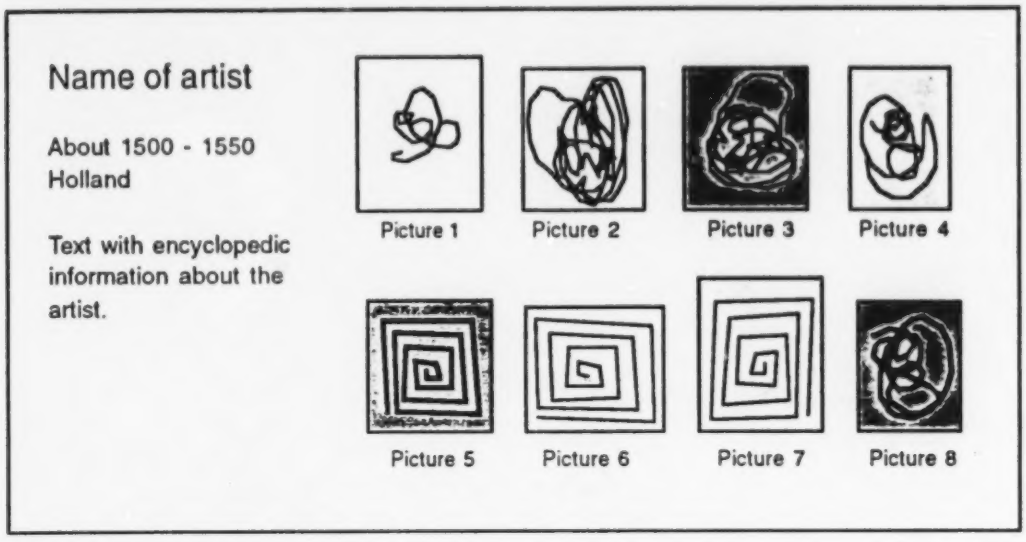
Find it is a "point of information" system, intended for the public. Terminals are placed, for example, in hotel lobbies. Information can be grouped in nine levels.

Info-video is also intended for use by the public. It can be used by retailers to present services and products, or by museums to supply visitors with information on exhibits.

Information on museums and exhibits

Museums have many informational needs. They must tell visitors about the current exhibit and provide information on the exhibits themselves.

Micro Gallery contains pictures of all 2200 works of art in the National Gallery in London, UK. The system constitutes a complete, illustrated electronic catalog. It is intended to make it easier for visitors to find information on individual works, and to find the works themselves. The museum is large and it is difficult to orient oneself there. Visitors can perform database search operations by pressing buttons



An example of information in a museum system. Mini pictures are in color. By "pressing buttons" more information may be accessed.

on the display. Information on a particular artist or painting can be accessed in several ways. There is a basic catalog and a historical atlas, both indexed by key words. There are also "lexicons" of picture types and artists. A successful search returns color "mini-pictures" and text. The text contains hypertext links, which allow the visitor to gradually access more detailed information. The system also lets visitors create personal maps, with the locations of the paintings of their choice.

Remote communication

New information technology is creating new remote communication opportunities. Architects can discuss architecture and interior decor with their clients; doctors can cooperate to make a diagnosis.

"Nuclear medical images" are frequently becoming common at some hospitals. The "digital x-ray department" will soon be a reality. Digital image processing offers tremendous advantages. Gray scale variation, for example, can be translated into more easily interpreted color differences. Traditional x-ray-film, can be digitized by a scanner, allowing them to be processed on a computer or distributed via modem over a dedicated telephone connection. Physicians at different hospitals can analyze the same x-ray simultaneously and discuss the diagnosis over the telephone. This is sometimes called *teleradiology*.

Personnel files

The *EDICON System* is a local *security system* consisting of personnel files with informational portraits of everyone at a given company. The system is used by companies where security is important, where employees must always wear clearly visible identification cards. The

system has been used at seven airports in the UK, including Heathrow and Gatwick near London. The *Suspect Identification System* is a more advanced version of the EDICON System. It is used by the Yonkers police department, in New York, USA, to identify criminal suspects.

Presentations

Image databases can be used for a variety of types of presentation, and for producing presentation materials. Geographically related data can be presented easily and efficiently by the *MilPres II* information system. The system was designed for defense applications in Sweden, but has many civilian uses, too.

Producing documents

Image databases and libraries, such as Artline, Clip Art 3–D, Encapsulated Maple, Grafix, Image Club Artroom, Image Gallery, Mercury DTP, Photo Gallery, Spectrum Clip Art Disk, or Universal, make creating documents with decorative illustrations quick and easy. A graphics library may be a very good complement to a traditional graphics program. The primary target group for these products is users of desktop publishing software who produce such things as internal reports, memos and overhead transparencies for presentations. Electronic libraries are the modern counterpart of scrapbooks full of copyrighted pictures.

Producing educational materials

Image databases are sometimes designed expressly for use in the production of educational materials. Such products can also be used for other purposes. *InterFACE* (the Interactive Facial Animation Construction Environment) is used to produce animated talking heads. The source material includes 40 "actors," each with 16–120 pre-programmed facial expressions. They could also be used to produce language courses since the lips were synchronized with the sound.

Multimedia production

Photobase is an U.S. image collection including 2,000 photographs for use in multimedia applications, stored digitally using Intel's DVI format (Digital Video Interactive).

Print media production

Image databases and libraries like the *HDTV (High Definition Television) Still-Image File System*, *Imagebuilder*, and *K 2000 Picture Desk* allow quick, easy handling of pictures in the production of daily newspapers and magazines.

Television production

Gallery 2000 is an image database that simplifies the handling of graphic images used in television. It is particularly useful for news production. Images can either be created locally using a "paintbox system" or copied with a scanner and stored on digital optical discs.

Creating personalized products

"The Bicycle Company" is a special department of the *"Information Age"* exhibit at the National Museum of American History in Washington. It is a demonstration of personalized bicycle production, using a CAD/CAM system, *"Custom Design"*. By pointing at images of various parts the visitor may "build" his or her bicycle.

Study

Some systems are designed to provide access to specialized information and to aid students. *MEDDIX DATA*, developed in Holland, includes 30,000 images. It is primarily intended for use by medical students, and includes information on many specialties. The database is a source of support material and data for students. Image databases may essentially eliminate the need for prepared microscopic slides that are used today.

Sales

Retail stores sometimes use "Point of Purchase" (POP) or "Point of Sales" (POS) displays interactive with computer terminals.

It will probably be possible to use similar systems to provide information on real estate (brokers and buyers), tourist destinations (travel agents and travelers), and signatures (security service companies and customers).

Sale of publication rights

Image databases will probably be used to keep track of and sell publication rights to photographs.

Bildbanken (The Image Bank) is a Swedish database intended to be a marketplace where photo agencies and photographers can meet the advertising agencies and publishers that buy their pictures. The system is designed to store up to 10 million pictures.

Image Bank, an American photo agency, has produced a video disc with 50,000 photos stored in analog format. The agency provides their customers, publishers and advertising agencies, with a source for interesting photo images.

Videotex information

Videotex, formerly known as videotext, is a two-way system for the transfer of information from databases to TV-sets with built-in decoders, or to specially adapted personal computers. Digital data signals are transmitted via the telephone network. A user calls the database from a terminal, and uses a remote control to browse through the database and find the desired information. In the future, it may even be possible to implement a voice-recognition-based user interface. Many countries have developed national systems. The first was viewdata (now Prestel) in the UK. Typical videotex users include real estate brokers and mail order companies. Videotex systems that permit good quality photo reproduction are sometimes called photo-videotex.

The FRN report also includes A discussion of systems for visual display, storage and distribution, and several search systems.

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